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The Hessian Fly in Oregon

By

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The Hessian Fly in Oregon

The Hessian fly has been in Western Oregon for more than thirty years. It is present in wheat fields every year. Serious injury to wheat has occurred in some localities in certain years when conditions were favorable to a maximum increase of the insect. A peculiar coincidence of unusually late seeding of winter wheat and weather conditions favorable to the Hessian fly led to severe damage to late fall-sown wheat in the spring of 1926. Spring wheat in some localities was also badly infested. Wheat seeded in October, 1925, was injured but little.

Barley and rye are also attacked by the Hessian fly, but are seldom seriously injured. Oats are free from this pest.

Description. The delicate mosquito-like fly has a reddish-brown to dusky-black body and dusky wings. The eggs, which are laid on the wheat leaves, are very minute, elongate-cylindrical, and of a pale yellowish red color. The maggots which develop from these eggs are found under the leaf sheaths against the wheat stems, usually at or near the nodes. They are elongate-oval, about 3/16 inch long, and of a glossy greenish white color when nearly full grown. The transition stage between the maggot and the fly is passed in the so-called "flaxseed," a dark-brown seed-like object about 3/16 inch long. These "flaxseeds" are found under the leaf sheaths against the stems usually at or near the nodes.

Fig. 1. Adult Hessian fly. Magnified about 10 times.

Life-history and habits. The winter is passed in the "flaxseed" stage in wheat stubble left from the previous season's harvest, in the volunteer wheat, and in wheat fields seeded before early October. The flies emerge from these "flaxseeds" during the first warm days of spring, usually in April. These are termed the first spring brood, and emergence continues for about a month after the first flies come out. These flies seek the nearest growing wheat, either fall or spring sown, and here they deposit their eggs in the grooves on the wheat leaves. A single female fly may lay as many as 320 eggs. The minute maggots that hatch from these eggs crawl down the leaves and under the sheaths where they are wrapped tightly around the wheat stems. They usually settle down at or near the crowns of the young plants or at the nodes of the older plants. Here they establish themselves and feed by rasping the tissues of the wheat plant and sucking its juice. They become full grown and change to the "flaxseed" stage during a period of time which is dependent on the temperature of the season. This period is usually about six weeks in April and May under Western Oregon conditions. Some of them then change, within the skin of the "flaxseed," to the stage of transition between the

maggot and the fly, the pupal stage. When the flies are formed they emerge as the second spring brood. The second spring brood of Hessian flies in Western Oregon usually emerges in June. As the winter wheat is nearing maturity at this time, this second spring brood usually causes little injury to that crop. Spring wheat may be considerably damaged by this brood if weather conditions are favorable to a maximum emergence of the flies. The flies which emerge as the second spring brood go through the same development as has been described for the first spring brood. When these have reached the "flaxseed" stage, the dry summer has set in and they do not emerge as flies until the first fall rains. About ten days after the first fall rains the flies emerge from "flaxseeds" in the stubble left in harvested fields. This is the fall brood of Hessian flies, and they often continue to emerge in the fields for about a month. All the "flaxseeds" in the stubble fields do not produce flies at this time; some of them stay in the "flaxseeds" until the following spring. The flies which emerge in the fall lay their eggs upon the young wheat plants developing in the stubble fields from grain shattered out at harvest time and on any planted wheat which they find above ground at that time. The maggots which hatch from these eggs develop to the "flaxseed" stage and remain in that stage, often on dead young plants, until the following spring.

Fig. 2. Hessian fly maggots on young wheat plant.

Injury. Wheat infested by the Hessian fly before jointing has occurred has a characteristic stunted appearance. The leaves are broader, less spreading, and of a darker green color than are those of healthy plants. Small plants and tillers may be killed outright before jointing. When jointed wheat stems are attacked, the injury is less obvious and consists of a weakening of the stems at the point attacked by the maggots. Such weakened stems often fall or "lodge" before harvest. Winter wheat, if seeded early enough to get a good start before cold weather sets in, is usually so far along as to be little injured by the spring broods of flies. Spring wheat in Western Oregon is often considerably thinned and otherwise injured by a severe infestation. On the other hand, wheat seeded very late in the fall of 1925, as well as spring wheat, was severely injured in many localities in the spring of 1926. The explanation of this unusual injury to winter wheat is to be found in the fact that this late-sown wheat was in a very immature stage, most at-

tractive to the Hessian fly, when the first spring brood of flies emerged in March, earlier than usual. The unusually warm weather of March and April, 1926, favored a maximum increase and hastened the second spring brood of flies, which emerged about the middle of May, several weeks earlier than usual. Weather conditions in May favored the emergence of a large second spring brood of flies, and the late-sown win-

Fig. 3. Hessian fly "flaxseed" on wheat straws from stubble field.

ter wheat, still so immature as to be attractive to the flies, was in many cases badly injured. This unusual coincidence of weather conditions most favorable both for two early maximum spring broods of Hessian fly and for a large acreage of very late-sown winter wheat may not occur again for a long time.

Control. All stubble fields should be plowed and the stubble deeply buried in the fall, as soon as possible after harvest. These stubble fields contain in the "flaxseeds" on the straw, or as "flaxseeds" or maggots in the volunteer wheat which has sprung up following the early rains, practically all the Hessian flies that will later attack the planted wheat. In many sections of Western Oregon the heavy clay loam soils bake so hard in the dry summers that good plowing can not be done until after several good rains. It may be impossible, therefore, to plow under the stubble before late August and September when the fall brood of flies

have left it for volunteer wheat close at hand. This volunteer wheat, however, will be in the stubble fields and will be destroyed by later plowing. It is important that all the stubble and volunteer wheat should be well buried so as not to be raked out by later harrowing. A few flies can increase enormously if conditions are right. If the straw was cut high it may be advisable to disk it prior to plowing. The Hessian flies on well covered stubble and volunteer wheat will be unable to work out through the covering soil in the following spring after the surface has been beaten hard by the winter rains.

Fig. 4. Stubble and volunteer wheat in young clover field, a favorable place for overwintering Hessian fly "flaxseeds."

Burning the stubble before the emergence of the fall brood of Hessian flies, in August or early September, would not kill enough of the "flaxseeds" to warrant endangering woodland and other property in the fire season. A large number of "flaxseeds" are always very low down on the stems, even just under the surface of the soil, and would not be reached by fire. This practice has proved ineffective in the east except where the remnants of the stubble left from the burning are immediately plowed under.

If clover has been seeded in the wheat and the stand is too good to be plowed up, little can be done to combat the Hessian fly. Such fields often have much volunteer wheat in them as well as all the unemerged "flaxseeds" in the stubble of the previous wheat crop. They are the principal source of the flies which injure neighboring wheat in the following spring. About all that can be recommended in this case is that wheat fields, especially very late fall-sown and spring wheat, should be located

as far as possible from the infested stubble and volunteer wheat in these young clover fields.

Fall wheat should not be seeded until after the first week in October and it would be safer, especially in the southern Willamette Valley, to seed after the middle of October. The fall brood of Hessian flies come out after the first fall rains and are often active until well into October. Wheat seeded in September will therefore become infested in the fall and serve as a wintering place for Hessian flies. The absolute "fly free" date, the date for seeding winter wheat to avoid fall infestation, at Forest Grove, Oregon, has been about October 15 over a period of eight years. Growers should not be misled, however, by this recommendation for seeding after the "fly free" date, to adopt a regular practice of seeding very late, in November or later. There is no advantage to be gained, as far as the Hessian fly is concerned, in seeding very much later than October 15. It is probable that October is the best time to seed winter wheat for optimum production.

Wheat seeded on a good seed-bed, to a variety of wheat well adapted to the locality, and at the right time, is seldom seriously injured by the Hessian fly. Wheat on a fertile soil tillers freely and quickly replaces tillers killed by the Hessian fly or other agencies. This is particularly true of winter wheat. In the case of spring wheat, a quickly maturing variety of wheat in a well prepared, fertile seed-bed will usually be less injured than a slow growing variety, even when seeded much later.

Wheat should never be seeded on wheat stubble if it is possible to avoid doing so. If it is found necessary to do this, the stubble should be deeply plowed in the fall, particular pains being taken to bury thoroughly beyond the reach of the harrow, all stubble and volunteer wheat. No volunteer wheat should be allowed to spring up before seeding. If winter wheat has been seeded by mistake in the spring, it should not be left for a crop the next year; such a field is an ideal place for maximum production of Hessian flies.

Neighboring farmers should cooperate in repressive measures as the Hessian fly is no respecter of property boundaries.